global warming and personal energy use: introduction

The earth's surface absorbs sunlight and radiates infrared energy to the atmosphere. Scientists agree that concentrations of greenhouses gases—the atmospheric gases that reflect infrared energy back to earth—are increasing. And most agree that build-up of these gases will cause changes in climate. But they're not sure how much, when and where climate will change. Increases of only a few degrees would seriously affect natural systems, agriculture and economies in most of the world. To stem the rise of global temperatures, we need to reduce the release of greenhouse gases. You can help!

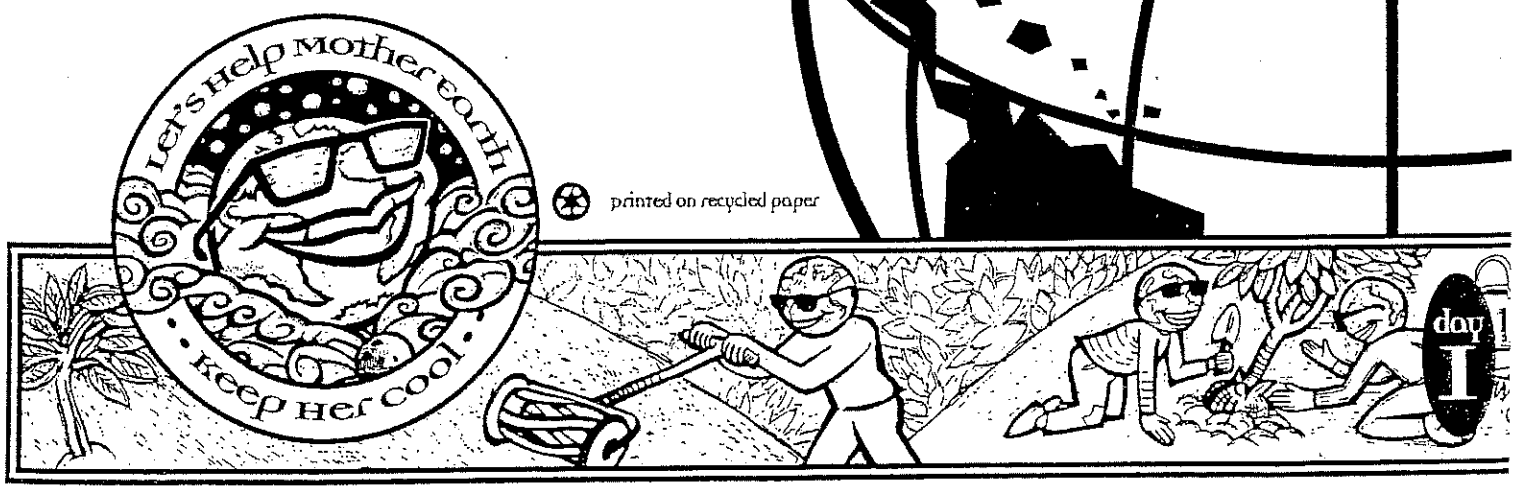
* Between one-half and three-fourths of the increase in CO_2 is a result of human activities.
* Burning fossil fuels in transportation, industry and heating is mainly responsible for the increase.
* CFCs, used in such things as refrigerators, home and car air conditioners, and heat pumps, are the second major type of greenhouse gases.
* Personal automobile and home energy use account for nearly a third of greenhouse gas emissions in the United States.

The following will help you understand how your energy use directly contributes to production of one of the most important greenhouse gases—CO_2.

you can make a difference!

After you have figured out how much carbon dioxide you produce every year, you can decide the best ways to reduce your contribution to the problem by using energy more efficiently. You probably can reduce energy use and costs for your family by 20 percent.

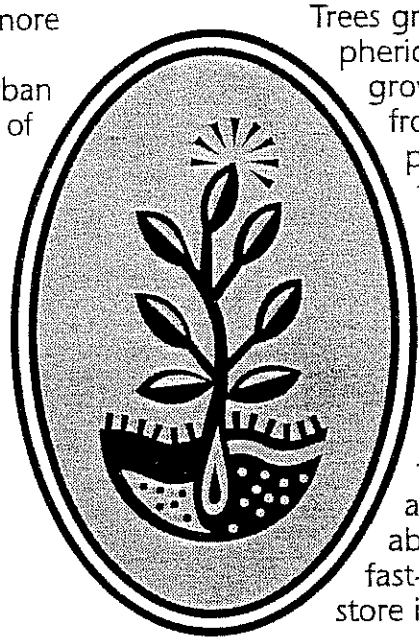
Fill out the worksheet with your family. You can make an immediate difference with minor changes in your personal energy use. Look carefully at your family's driving habits, hot water use and heat/air conditioning settings.



Global warming and personal energy use: Be a Tree steward

Each American is responsible for more than two tons of carbon each year. Because American society is more urban and industrial than much of the rest of the world, each of us in the U.S. is responsible for putting a lot more carbon into the atmosphere than others who live on this planet. Here's how we rank compared to some other parts of the world:

USA - 2.3 tons
Canada - 1.8 tons
Former Soviet Union - 1.6 tons
Western Europe - 0.9 tons
Japan - 0.9 tons
China - 0.2 tons
India - 0.1 tons



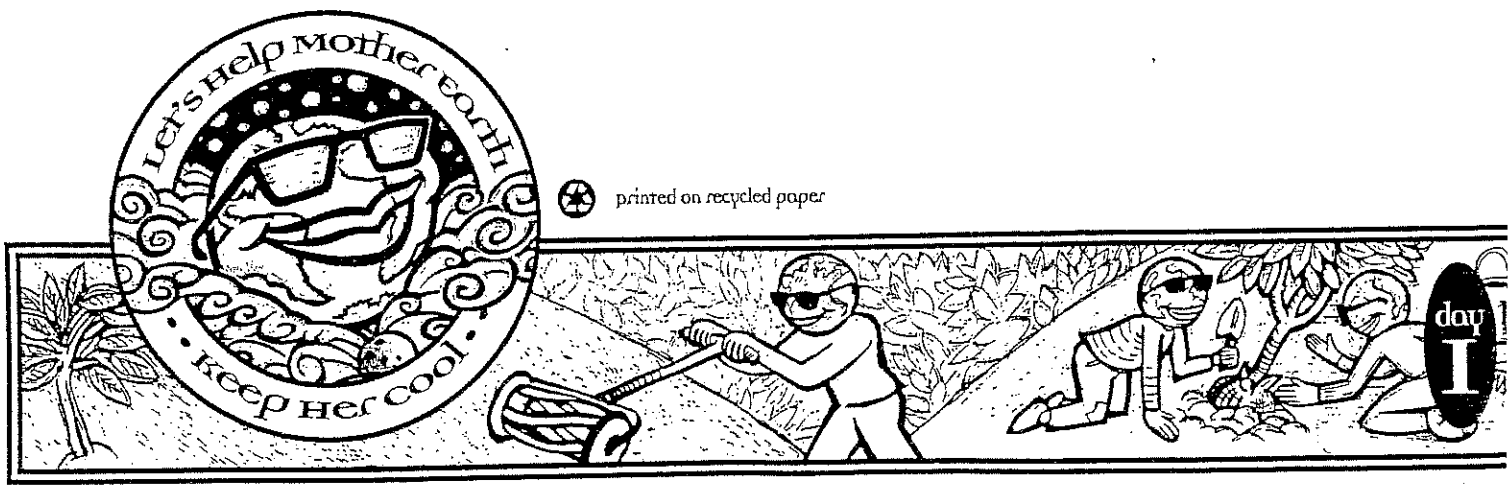
Trees grow using the carbon from atmospheric carbon dioxide. The larger trees grow, the more carbon they remove from the atmosphere. If Americans plant and care for trees, they can take personal responsibility for their carbon dioxide emissions and do their part to prevent global warming.

How many seedlings must you plant to store the carbon you'll be responsible for during the rest of your life? When trees are young, they grow and store carbon in small amounts each year. When they are about 10-20 years old, trees enter the fast-growing period of their lives and store increasingly more carbon each year.

To decide how many seedlings or how many 10-year old trees you want to water, trim, and nourish, use the chart below to compare:

Your Age	***Seedlings***	***or***	***10-Year Old Trees***
0	50		30
10	60		35
20	80		40
30	120		50
40	210		70
50	550		95

(Note: These are excerpts from a brochure prepared by Dr. Rowan Rowntree, Project Leader, Urban Forest Ecology Research, Northeastern Forest Experiment Station, US Forest Service.)



Global warming and personal energy use: How cool is your energy use?

CO_2 emissions from cars and trucks — Your family's present vehicle

1. Total miles driven each year. (avg. 12,000)	_____ miles
2. Efficiency of vehicle (avg. 22 miles per gallon)	÷ _____ mpg
3. Estimated gallons of gas consumed (line 1 divided by line 2)	= _____ gal
4. CO_2 released per gallon of gas used	x 20 lb CO_2/year
5. Annual CO_2 your family produces from driving (line 3 x line 4)	= _____ lb CO_2/year

CO_2 emissions from home energy use

	electric	natural gas
6. Last year's total energy costs	$576	$252
7. Cost per fuel unit $.11/kWh for home electric use $.60/therm for home natural gas use	÷ $.11 per kWh	÷ $.60 per therm
8. Total home energy used (in fuel units) Divide line 6 by line 7 seperately for electricty and natural gas.	=_____kWh/yr.	=_____therm/yr.
9. Amount of CO_2 produced per unit of fuel used Natural gas = 12 lb CO_2 per therm Electricity = 2.5 lb CO_2 per kWh	x 2.5 lb CO_2/kWh	x 12 lb CO_2/therm
10. Annual CO_2 your family produces from home energy use (line 8 multiplied by line 9)	A. =_____lb CO_2/year from electricity	B. =_____lb CO_2/year from natural gas
11. Total home energy CO_2 (add 10A and 10B)	= _____	

CO_2 emissions from all your personal energy use

12. Grand total amount of CO_2 produced by your household per year. (add totals from 5 and 11)	_____ lb CO_2 per year
13. Average amount of CO_2 "fixed" by a tree each year: 26 lbs	÷ 26 lb CO_2 per tree per year
14. Number of trees you'd need to plant to offset this amount of CO_2 (divide line 12 by line 13)	= _____ trees per year

Keep it cool: equal out your CO_2 by planting trees

day 1

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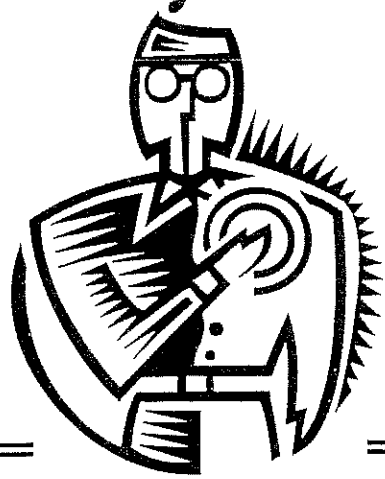
Beat The Heat: pledge on global warming

Dear Parents and Students,

Please fill out the following pledge to save a ton of CO_2. (Note: that's at least $100 in energy savings each year!)



PLEDGE

To help save the planet from global warming, I

_____

pledge to review this worksheet with my family to send **ONE TON** less carbon dioxide (CO_2) gas into the atmosphere this year! Our Family Savings Plan includes the energy saving steps we've checked below.

1. *Car Smarts*

Treat our car to a tune-up once a year... Save 900 pounds_____

When it's safe, walk or bike two miles a day instead of pushing the gas pedal... Save 730 pounds_____

Combine our car errands into one fuel-saving trip... Save 500 pounds_____

Keep our car tires inflated... Save 250 pounds_____

Trade in the gas-guzzler for a car that gets five more miles per gallon... Save 2,000 pounds_____

*Total CO_2 saved here*_____

2. *Electricity Simplicity*

Replace a 100-watt incandescent bulb with a 27-watt compact fluorescent bulb... Save 160 pounds for each bulb_____

Replace a 75-watt incandescent bulb with an 18-watt compact fluorescent bulb... Save 120 pounds for each bulb_____

Lights out when we leave a room... Save 120 pounds for each room_____

*Total CO_2 saved here*_____

3. *Getting into Hot Water*

Give our water heater a warm-up jacket of insulation to make it more efficient...We use: (check one) (electric) Save 600 pounds_____ (gas) Save 260 pounds_____

Cool the hot water heater down by 10 degrees (but not below 120 degrees Fahrenheit)... (check one) (electric) Save 660 pounds_____ (gas) Save 290 pounds_____

Replace our showerheads with 1.5 gallon low flow showerheads.... (check one) (electric) Save 920 pounds_____ (gas) Save 400 pounds_____

Chill out our washing machine by doing four out of five loads in cold water... (check one) (electric) Save 460 pounds_____ (gas) Save 200 pounds_____

*Total CO_2 saved here:*_____

4. *Home is Where the Heat is*

Nudge our thermostat down one degree this winter.... (check one) (electric) Save 410 pounds_____ (gas) Save 180 pounds_____

Give that overworked heating system a 10 degree rest when we're in bed at night... (check one) (electric) Save 2,070 pounds_____ (gas) Save 900 pounds_____

Turn our air conditioner's thermostat up a single degree this summer.... Save 220 pounds_____

Get an annual tune-up
...of our air conditioner .. Save 220 pounds_____
...of our furnace (check one) (electric) Save 1,030 pounds_____ (gas) Save 450 pounds_____

Plug leaks around windows and doors with weatherstripping—and close the curtains and shades at night... (check one) (electric) Save 1,600 pounds_____ (gas) Save 700 pounds_____

*Total CO_2 saved here:*_____

5. *Turning Over a New Leaf*

Plant a tree on the south or west side of our home to provide cooling shade... Save 150 pounds_____

6. *Making Old as Good-as-Gold*

Recycle one aluminim can a day..... Save 140 pounds_____
Recycle one glass bottle a day..... Save 100 pounds_____
Recycle one newspaper a day..... Save 50 pounds_____

Add Items 1-6 OUR SAVINGS PLEDGE:_____

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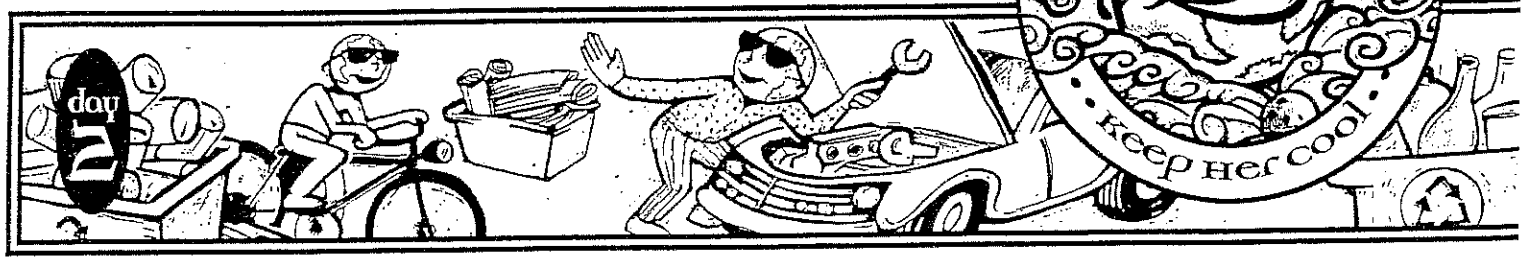
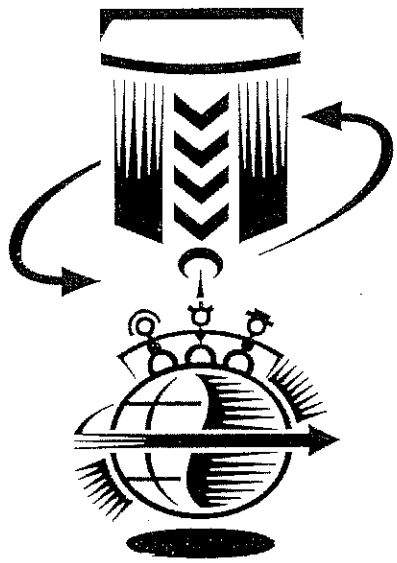


Beat The Heat: Earth Saver Award



This award is presented to

_____

Name

and family who are taking action each day to

COOL GLOBAL WARMING.

By their actions, they honor this pledge:

We promise to use less energy and fulfill our family savings plan, so that

ONE TON LESS CARBON DIOXIDE

will fill our skies each year.

_____

Student Name

_____

Family/parent Name

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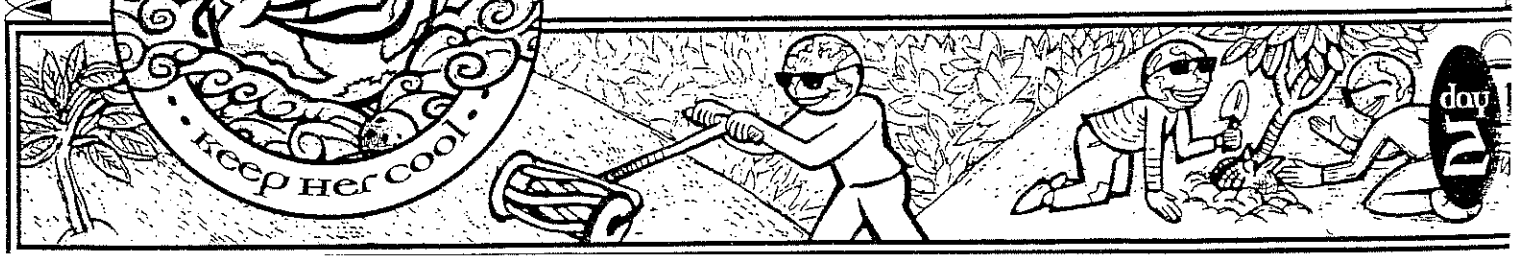
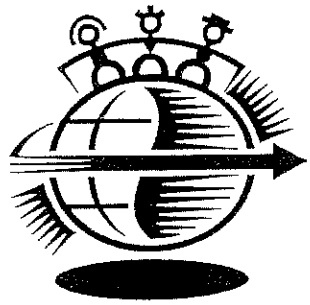


Let Mother Earth Keep Her Cool: petition on global warming



Dear Mayor Horton,

As children, we are very concerned about global warming and its threat to the Earth's future — our future. In response, we and our families have pledged to reduce the fossil fuel used to power our homes and cars, so that for each family one ton less carbon dioxide will rise to the atmosphere during the year.

We urge you to take the same energy-saving actions at City Hall and lead California in a campaign to cut back CO_2.

STUDENT SIGNATURES

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Sponsoring Teacher _____

Grade ____ School Name _____

Total Number of Signatures _____

Teacher's Signature _____

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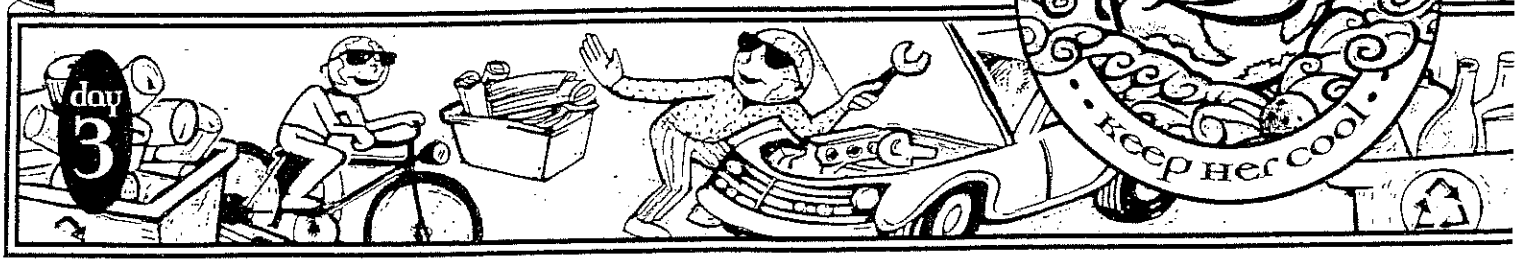
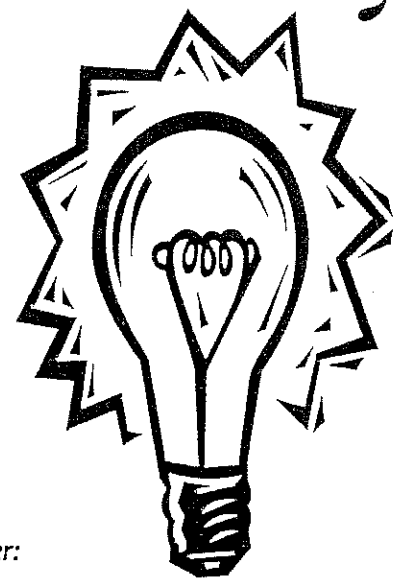


Let Mother Earth Keep Her Cool: Energy Facts



Circle the best answer:

1) Which light bulb is more efficient?
- A. Incandescent bulbs
- B. Compact fluorescent bulbs
- C. Halogen bulbs

2) There are many causes of global warming, but the use of fossil fuels is the primary source contributing to climate change. Which of these automobile fuels produce the greatest amount of CO_2 per gallon of gas?
- A. Natural gas
- B. Diesel
- C. Gasoline

3) What country uses the most energy for its population?
- A. United States
- B. Germany
- C. Japan

4) Where do we consume the most energy in the US?
- A. Home
- B. Businesses
- C. Cars

5) Replacing an incandescent bulb with a fluorescent bulb will help the environment by:
- A. Eliminating the equivalent of 46 gallons of oil
- B. Reducing waste and toxins in landfills from discarded bulbs
- C. All of the above

6) What is the most commonly used heating fuel in Chula Vista?
- A. Natural gas
- B. Oil
- C. Wood

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What You Can Do To Prevent Global Warming: Make Your School a Cooler Place!

After your teacher divides you into groups, do the exercise and fill out the worksheet. Each group should designate a project leader who will direct the discussion and report to the rest of the class what your group has decided to do.

- Each team will come up with a plan to implement the project, with the following worksheet serving as a guide.
- The project leader of each team should fill out - on a separate sheet of paper - the worksheet at the end of the discussion and submit it to the teacher.

Group A: Chula Vista Kids Save Energy and Keep It Cool

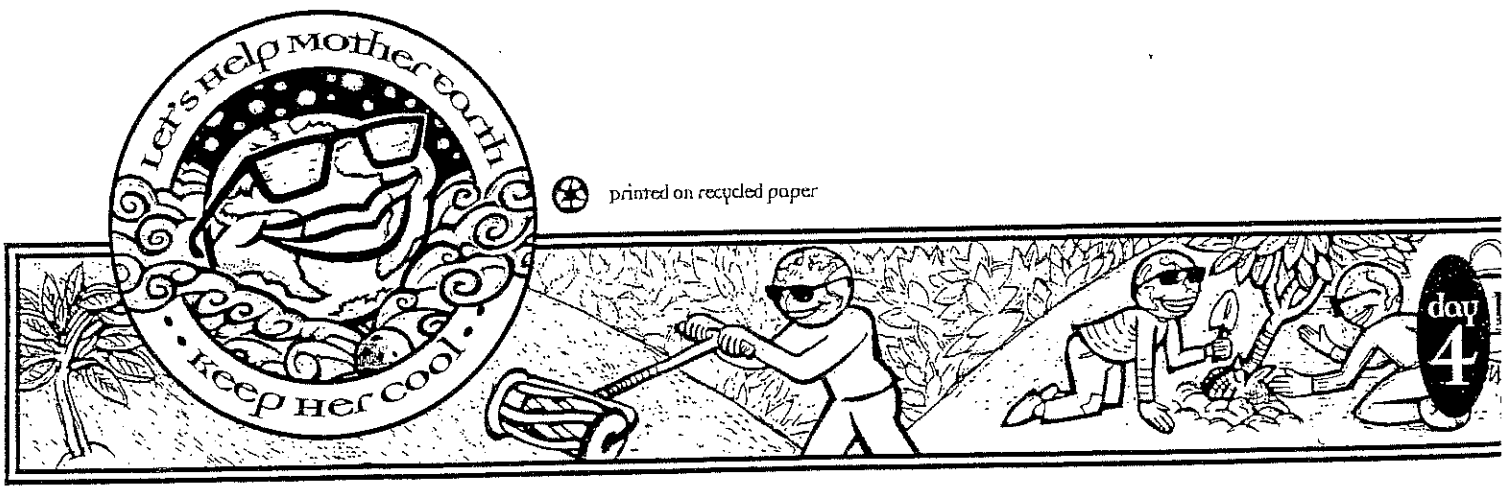
Develop a student/teacher team to coordinate a school energy savings program that will implement volunteer measures and educate your fellow students at the same time. Set a specific goal to reduce energy by a certain percentage, i.e. you decide if it should be 20%, 30% etc., for a designated period of time such as one month or one year. Have your group track the energy reduction and compare the school's energy bills before and after implementation of your program. Determine after the designated amount of time if the program was successful and why/why not.

Group B: Kids In Charge

Develop a student/teacher/principal team to implement an energy retrofit program in your school. Have the team invite your local utility to work with your class to actually retrofit the school and put the team "in charge" with follow-through, making energy and cost-saving recommendations and presenting the plan to appropriate decision-makers in the school.

Project Team_____ (indicate Group A or Group B)

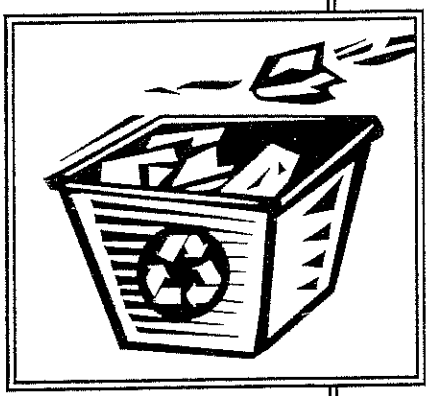
a) Who are the members of your team?
b) Who else should be part of the team aside from students?
c) What do you plan to do with the team?
d) How do you plan to save energy?
e) Who are the people you will need to assist you in your plan?
f) How long will this project take?
g) When will it end?
h) How will you evaluate your efforts?



what you can do to prevent global warming: keep your home cool

1. Plant some trees around your home.
CO_2 reduction - 20 lbs/yr

2. Use a push mower to cut your lawn instead of a power mower.
CO_2 reduction - 80 lbs/yr



3. Replace your home's refrigerator with a high efficiency model.
CO_2 reduction - 220 lbs/yr

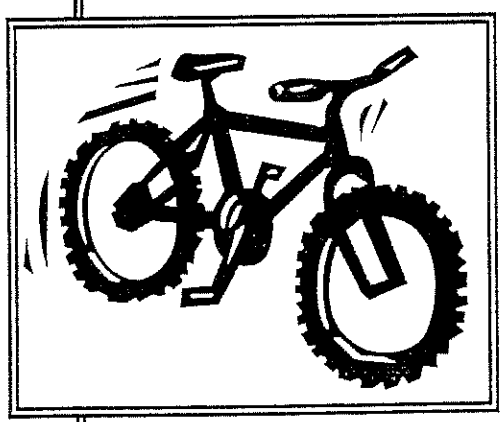
4. Buy food and other products with reusable or recyclable packaging instead of in non-recyclable containers.
CO_2 reduction - 230 lbs/yr

5. Replace your current washing machine with a low energy, low water use machine.
CO_2 reduction - 440 lbs/yr

6. Install a solar system to help provide your hot water.
CO_2 reduction - 720 lbs/yr

7. Recycle all of your home's waste, newsprint, glass, metal and some plastics.
CO_2 reduction - 850 lbs/yr

8. Encourage your family to leave the car at home two days a week (bike or take the bus).
CO_2 reduction - 1590 lbs/yr

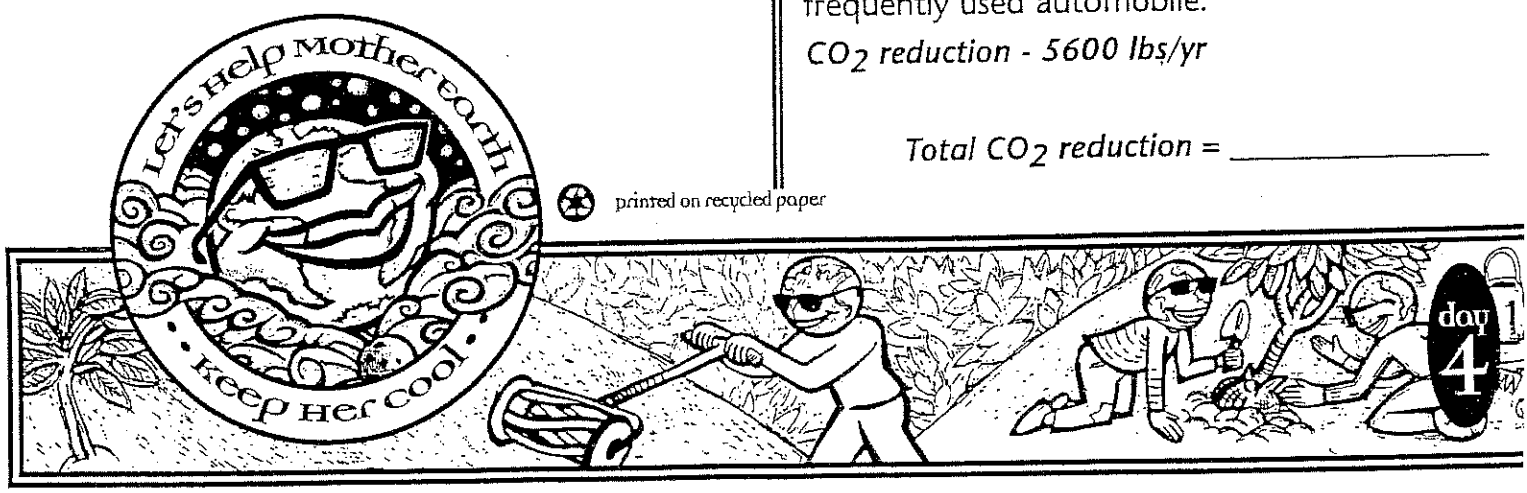


9. Insulate your home, tune-up your furnace, and install more efficient showerheads.
CO_2 reduction - 2480 lbs/yr

And the Most Important thing you can do is:

10. Purchase a fuel-efficient car, rated at 32 mpg or more, to replace your most frequently used automobile.
CO_2 reduction - 5600 lbs/yr

Total CO_2 reduction = _____



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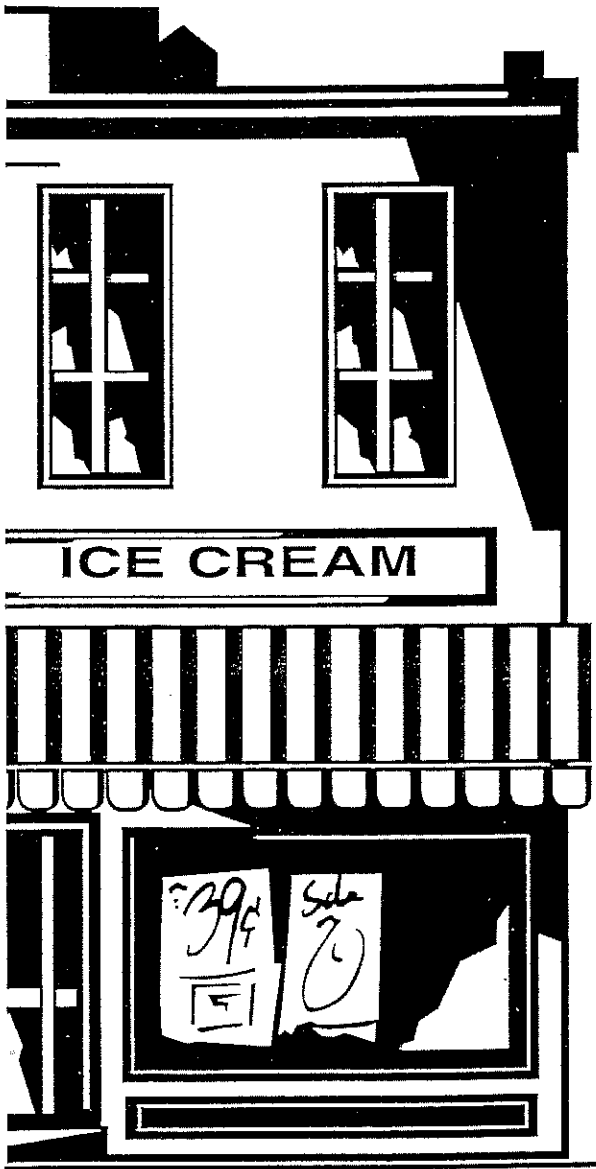
what can local government do: introduction

Cities are major sources of greenhouse gas emissions, and should participate in efforts to reduce emissions. Every city has a role to play.

Through activity at the local level, cities have the opportunity to turn global environmental policies into concrete actions. Cities can contribute to controlling global warming, while at the same time protect and maintain the quality of life of their citizens.

The following are a few examples of actions cities can take:

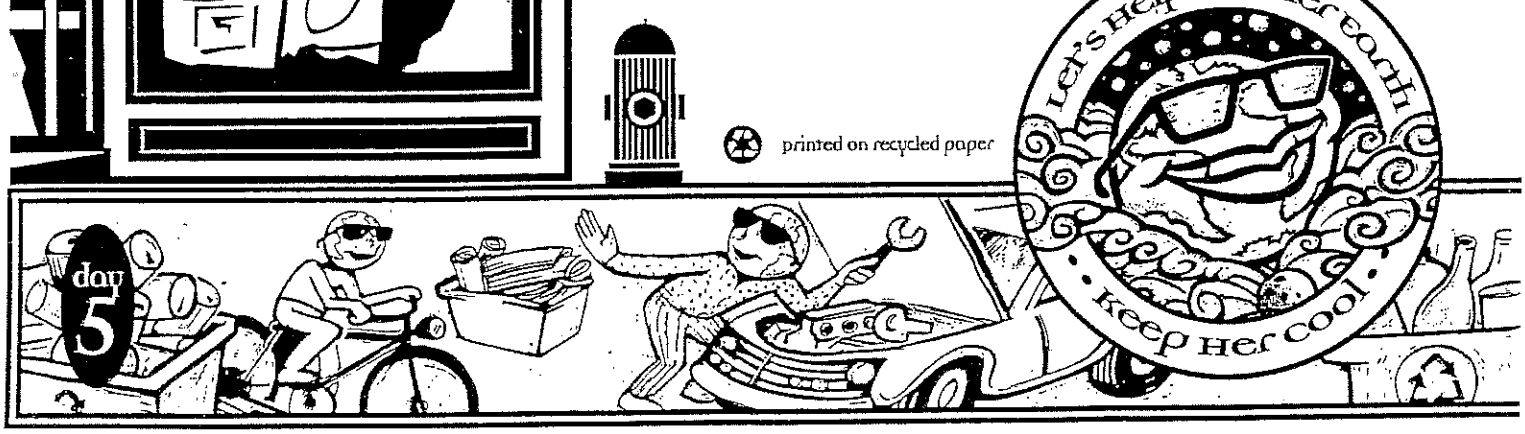


- By implementing better parking management and improved bicycle and pedestrian access, and by ensuring that public transportation is available and convenient, local governments can encourage a shift away from the use of cars and encourage citizens to carpool, walk, use public transit and bicycle.

- By allowing homes and businesses to be built in close proximity, local governments can help reduce commuting distances.

- By promoting energy efficient building techniques, local governments can reduce energy use for heating, cooling and lighting.

- By encouraging tree planting, local governments can enhance the natural absorption of CO_2 from the atmosphere.



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what can local government do: mock city council

help prevent global warming, cities need to create new public policy that will address two major issues regarding rbon dioxide emissions:

1) reducing the number of cars on the road by providing alternative transportation
2) reducing energy use in homes and businesses

his is your opportunity to play a role in deciding what the City Council should do.

1) Divide into groups of five.
2) Each student in a group will play a role, as follows:
   a) a City Council member
   b) a scientist
   c) an environmentalist
   d) an industrialist
   e) a local resident
3) Each group should select one policy issue for discussion, either transportation or energy use. The group should provide suggestions on how to solve the policy problem, according to the role each member plays.
4) Each group should designate a secretary (other than the student who is playing the role of the City Council member) who will do the reporting after the discussion.
5) After the discussion, all students playing the role of City Council member should get together and create a mock City Council. Each group secretary will present the suggestions to the mock City Council.
6) The mock City Council should designate a leader who will summarize the suggested policies.
7) From the suggestions presented, the class may choose one idea which they can develop for an exhibit on global warming for World Environment Day.

Here are some questions your group should consider:

on transportation

1) Should the City provide residents with more incentives to encourage them to take mass transit instead of private cars?
2) What incentives would be the most appealing to residents?
3) How should cities be planned in order to lessen the dependency of residents on automobiles and get them to ride buses and trolleys instead?

on energy use

1) Should the City require home owners to retrofit their houses with less energy-consuming devices?
2) How can the City encourage businesses that consume a lot of electricity to create energy-saving programs?